



FIG.1

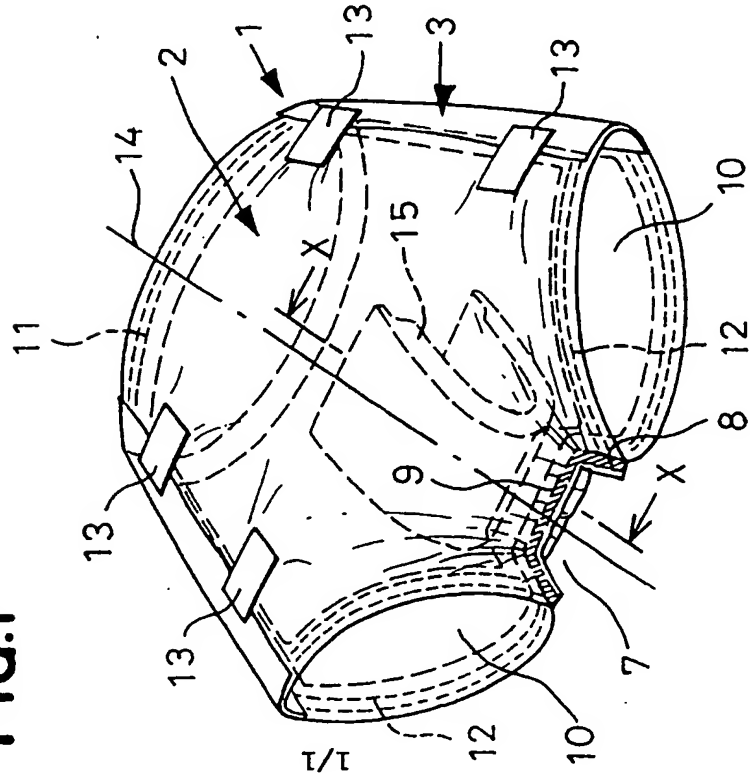
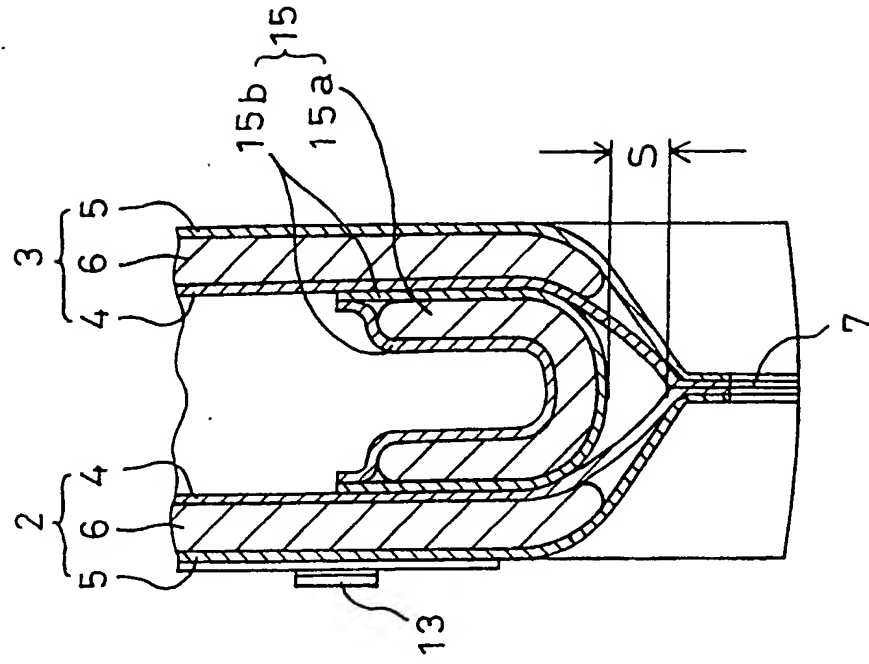


FIG.2



-1-

## DISPOSABLE DIAPERS

The present invention relates to a disposable diaper.

Typical example of the open type disposable diaper having tape fastener means used to fasten front and rear bodies to each other at the level of waist line is disclosed in Japanese Patent No. 1977-40267. This example comprises a liquid-permeable topsheet, a liquid-impermeable backsheet, and a liquid-absorbent panel sandwiched therebetween wherein a pair of side flaps are formed by portions of the top- and backsheets extending outward beyond laterally opposite sides of the panel and the respective side flaps are formed at a crotch level with cutouts destined to define leg-openings around which the respective side flaps are provided with elastic members serving to seal the side flaps around the respective legs of the wearer and wherein the rear body is provided at laterally opposite sides thereof with tape fasteners used to fasten the rear body to the front body.

As the diaper disclosed in the above-identified Japanese Patent No. 1977-40267 is typical, the cutouts formed in opposite sides of the crotch zone for improving the fitting of the diaper to the wearer's body necessarily reduce the width of the crotch zone and it is practically

impossible for the crotch zone to thoroughly surround the wearer's thighs. The crotch zone thus width-reduced inevitably decreases the ability of the crotch zone to absorb liquid excretion, particularly where liquid excretion readily occurs opposite side edges of the crotch zone.

Generally in the well known diaper of the type as disclosed in the above-identified Japanese Patent, a fold line of the crotch zone corresponding to a boundary line of front and rear bodies horizontally extends parallel to the waist line. In addition, the liquid-absorbent panel has so-called semi-rigidity, since it often comprises a more or less compressed accumulation of fluff pulp and tissue papers covering top- and bottom surfaces of this accumulation. Accordingly, a crotch zone of the diaper can not get to fit the corresponding zone of the wearer's body, thus not only giving the wearer the feeling of incompatibility but also causing said leakage of excretion.

In view of the problem as mentioned above, it is a principal object of the invention to provide a disposable diaper having a crotch zone configured so as to combine an advantage of the open type diaper with an advantage of the short-pants type diaper that has thoroughly covering

portions surrounding respective legs of a wearer, and thereby to eliminate the drawbacks of the well known diaper as mentioned above.

The advantage of the open type diaper lies in that the diaper can be adjustably tightened around a waist-opening as well as around leg-openings, and the advantage of the short-pants type diaper lies in that the diaper has hoses to cover at least inner sides of the wearer's thighs and a crotch zone can be dimensioned to be larger than that in the well known diaper.

To achieve the object set forth above, the invention generally resides in a disposable diaper comprising front and rear bodies, characterized by that said front and rear bodies are separately formed and welded together adjacent lower ends along a welding line convexly curved toward waist lines of said front and rear bodies so as to define a crotch zone, wherein an auxiliary liquid-absorbent panel being elongate longitudinally of said front and rear bodies is bonded at least at longitudinally opposite ends thereof to the top surface of said crotch zone.

Preferably, said crotch zone defined by said convexly curved welding line is formed along its outer edges with a correspondingly curved cutout.

With the article constructed according to the invention as outlined above, the auxiliary liquid-absorbent

panel is reliably centered to the wearer's crotch and laterally opposite sides of the crotch zone cover at least inner sides of wearer's thighs, respectively. In this manner, the crotch zone of the diaper covers substantially the entire crotch of wearer.

The invention will be described by way of example with reference to the accompanying drawings, in which:

Fig. 1 is a front view showing an embodiment of a diaper constructed according to the teachings of the invention; and

Fig. 2 is a schematic sectional view taken along a line X-X in Fig. 1.

Referring to Figs. 1 and 2, a diaper's basic structure 1 generally comprises front and rear bodies 2, 3. The rear body 3 is transversely dimensioned to be larger than the front body 2. Each of front and rear bodies 2, 3 comprises a liquid-permeable topsheet 4, a liquid-impermeable backsheet 5 and a liquid-absorbent panel 6 sandwiched between said top- and backsheets 4, 5.

Lower ends of front and rear bodies 2, 3 are formed at middle positions with cutouts 7 convexly curved toward

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waist lines of front and rear bodies 2, 3. The front and rear bodies 2, 3 are welded together along a heat or supersonic welding line 8 extending parallel with the cutouts 7 so as to leave narrow edges of the cutouts 7 not welded. A size, shape and curvature radius of the welding line 8 may be appropriately selected depending on whether the diaper is for adult or for baby so far as the welding line 8 is convexly curved toward waist lines of the front and rear bodies 2, 3, and at least inner sides of respective leg-openings 10 extend downward beyond an apex 9 of the convexly curved welding line 8.

Circumferentially stretchable elastic members 11, 12 are interposed between respective edges of top- and backsheets 4, 5 extending beyond the panel 6 around waist-opening and leg-openings, respectively, and said edges are closed together by hot melt type adhesive or said welding means. Laterally opposite side edges of top- and backsheets 4, 5 extending beyond the panel 6 are also closed together in the same manner and the rear body 3 is provided on laterally opposite side edges with a plurality of fastener means 13 each comprising a tape fastener applied on one side with pressure-sensitive adhesive, by which the laterally opposite sides of the rear body 3 are fastened to the corresponding sides of the front body 2.

While laterally opposite side edges and lower edges

around the respective leg-openings of front and rear bodies 2, 3 are illustrated as extending neither parallel with nor perpendicularly to a vertical axis 14, these side edges may extend parallel with the vertical axis 14 and these lower edges around the respective leg-openings may extend perpendicularly to said vertical axis 14 within the scope of the invention.

The diaper's basic structure 1 is provided on the top surface of its crotch zone with an auxiliary liquid-absorbent panel 15 which is elongate longitudinally of the diaper's basic structure 1. The auxiliary panel 15 comprises a liquid-absorbent core 15a covered with liquid-permeable sheets 15b and is bonded at least at longitudinally opposite ends to the top surface of the topsheet 4 with means of adhesive. With the diaper's basic structure 1 being put on a wearer, the auxiliary panel 15 is curved in a U-shape together with the diaper's basic structure 1. The auxiliary panel 15 is preferably bonded to the diaper's basic structure 1 in a manner such that the auxiliary panel 15 thus curved floats above the top surface of the basic structure's crotch zone and more specifically the curved auxiliary panel 15 has its outer bottom spaced by a distance S of at least 10 mm from the top surface of the basic structure's crotch zone. However, it is also possible within the scope of the invention to arrange the

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auxiliary panel 15 so that the bottom of the auxiliary panel 15 may remain in contact with the top surface of the diaper's crotch zone even in the curved state.

The auxiliary panel 15 may have its bottom layer comprising a liquid-impermeable sheet and/or have stretchable side flaps extending from laterally opposite sides thereof without departure from the scope of the invention.

The diaper's basic structure 1 is opened at the laterally opposite sides, therefore, at the waist-opening as well as the leg-openings and, after erected with use of the fastener means as illustrated by Fig. 1, the laterally opposite sides are closed and, in consequence, the waist-opening as well as the leg-openings are also closed. Sizes of these openings depend on an overlap width of front and rear bodies 2, 3 and the overlap width depends, in turn, on sizes of individual wearer's waist and legs (thighs).

Components of the diaper 1 may be made from materials commonly used in the well known diaper. For example, the topsheet 4 may be made of nonwoven fabric, the backsheet 5 may be made of plastic film, the panel 6 may be made of fluff pulp mixed with superabsorbent polymer, the elastic members 11, 12 may be made of natural or synthetic rubber, and substrate of the fastener means 13 may be made of fine quality paper or laminate of nonwoven fabric and plastic

film. The core 15a of the panel 15 may be made of fluff pulp mixed with superabsorbent polymer and the sheet 15b covering the core 15a may be made of nonwoven fabric.

With the diaper constructed according to the invention as described above, the formation of the cutouts in opposite sides of the crotch zone so as to define the leg-openings never results in unacceptably narrow width of the crotch zone, since the welding line convexly curved toward the waist line allows a width of the crotch zone defined between the opposite side edges of the crotch zone to be dimensioned adequately large. In addition, the formation of such welding line allows the crotch zone to cover at least inner sides of the respective thighs and provision of the auxiliary liquid-absorbent panel over the crotch zone allow the crotch zone to absorb liquid excretion sufficiently to prevent any liquid excretion from leaking along the laterally opposite side edges of the crotch zone since the absorbent material exists on the welding line along which the separately formed front and rear bodies are welded together.

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CLAIMS

1. A disposable diaper having front and rear bodies each comprising a liquid-permeable topsheet, a liquid-impermeable backsheet and a liquid-absorbent panel sandwiched therebetween, said front and rear bodies being separately formed and welded together adjacent lower ends along a welding line convexly curved toward waist lines of said front and rear bodies so as to define a crotch zone, wherein an auxiliary liquid-absorbent panel which is elongate longitudinally of said front and rear bodies is bonded at least at longitudinally opposite ends thereof to the top surface of one or both of said bodies so as to be located over said crotch zone.

2. A disposable diaper according to Claim 1, wherein said crotch zone defined by said convexly curved welding line is formed along its outer edge with a correspondingly curved output.

3. A disposable diaper according to Claim 1 or 2, wherein said auxiliary panel, when curved, is spaced from the top surface of said crotch zone.

4. A disposable diaper according to Claim 1 or 2, wherein said auxiliary panel is arranged so that it remains in contact with the top surface of said crotch zone even when the auxiliary panel is in a curved state.

5. A disposable diaper substantially as herein described with reference to the accompanying drawings.

Patents Act 1977  
Examiner's report to the Comptroller under Section 17  
(The Search report)

Application number  
GB 9317595.8

**Relevant Technical Fields**

(i) UK Cl (Ed.L) A5R (RPG, RPL)

(ii) Int Cl (Ed.5) A61F 13/15

Search Examiner  
R J WALKER

Date of completion of Search  
4 NOVEMBER 1993

**Databases (see below)**

(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

(ii) ONLINE DATABASE: WPI

Documents considered relevant following a search in respect of Claims :-  
1-5

**Categories of documents**

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|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>X:</b> Document indicating lack of novelty or of inventive step.</p> <p><b>Y:</b> Document indicating lack of inventive step if combined with one or more other documents of the same category.</p> <p><b>A:</b> Document indicating technological background and/or state of the art.</p> | <p><b>P:</b> Document published on or after the declared priority date but before the filing date of the present application.</p> <p><b>E:</b> Patent document published on or after, but with priority date earlier than, the filing date of the present application.</p> <p><b>&amp;:</b> Member of the same patent family; corresponding document.</p> |
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Category	Identity of document and relevant passages	Relevant to claim(s)
	NONE	

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